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(54) **CONTINUOUS VERTICAL CONVEYOR**

KONTINUIERLICHER SENKRECHTFÖRDERER

TRANSPORTEUR VERTICAL CONTINU

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Description

[0001] The present invention relates in general to conveyors.

[0002] More particularly the present invention relates to a chain driven continuous vertical conveyor with a number of slats carried by a number of pairs of chains wherein the slats cooperate to form a multi-sectional elevator surface.

[0003] The prior art includes continuous chain conveyors such as the Franke U.S. Patent 4,627,530 dated December 9, 1986 which teaches a conveyor for making horizontal and vertical runs wherein a continuous surface is provided on horizontal runs. A support member having a support surface is attached at the end to a pair of outer chains and on the other end to a pair of inner chains. In contrast, the present invention provides a vertical conveyor having multi-sectional elevator surfaces capable of lifting relatively wide and relatively heavy loads, as well as carrying loads downwardly.

[0004] US-A-3653490 describes a transport device in which a plurality of equal length closed loops are adapted to move about a plurality of guides in a circulatory path, with part of the travel of each loop following a vertical path, the respective vertical paths being parallel to each other with supports on the respective loops enabling a load to be lifted or lowered over said vertical paths and in opposing horizontal directions. The supports are synchronised by a series of guides arranged together though to the side of the upper region of the respective vertical paths to facilitate movement of the load in different directions. However discharge or loading of a load can only occur at the upper or lower extremity of said vertical paths.

[0005] GB-A-1038955 describes a conveyor according to the first part of claim 1 including a section or sections for raising or lowering a load and a section for moving the load horizontally. Said section or sections comprise parallel vertical paths for parts of two different closed loops, with the loops being synchronised by an appropriate complex arrangement of guides for the respective loops so that crossbars extending between the loops can move with the loops to thus support a load. However, again discharge or loading of a load can only occur at the upper or lower extremity of said vertical paths.

[0006] US-A-4973293 describes a multiple drive chain system wherein a number of different length, closed loop, chains pass around a number of guides so that each chain has a vertical section with the respective vertical sections being parallel to each other. The chains each carry supports which are synchronised with each other so as to carry a load over the path of said vertical sections. However, again discharge or loading of a load can only occur at the upper or lower extremity of said vertical sections. According to a further embodiment of the conveyor of US-A-4 973 293 a platform is placed on support means to provide a generally planar, horizontal elevator surface.

[0007] According to the present invention there is provided a continuous vertical conveyor comprising:

first and second pairs of continuous lengths of roller chain,

at least one pair of drive sprockets carrying, guiding and driving each of said pairs of chain in a single direction continuously,

each of said first and second pairs of chain moving in parallel paths and each pair carrying at least one support means extending therebetween, characterised in that the or each support means is in the form of a slat which provides a generally horizontal support surface when said pair of roller chains is moving in a vertical direction,

synchronizing means being provided for aligning two or more of said slats carried by said first and second pairs of chain to form a generally planar, horizontal, multi-sectional elevator surface wherein two slats are adjacent each other when said first and second pairs of chains are moving in a vertical direction.

[0008] The aim of the present invention is to provide a continuous vertical conveyor whereby a load can be loaded onto or discharged from the conveyor at any desired position along the vertical path of the conveyor, by pushing the load horizontally onto or off the conveyor support surface.

[0009] In accordance with one embodiment of the present invention, a live storage accumulator is provided which can be utilized in conjunction with two vertical conveyors. One of the vertical conveyors loads the accumulator and a second continuous vertical conveyor is used to unload the accumulator. The accumulator includes multiple horizontal live storage levels which are stacked vertically. Containers stored in the accumulator may be unloaded independently of the loading function.

[0010] The continuous vertical conveyor of the present invention is able to lift relatively wide and heavy loads by utilizing multiple slats wherein each slat is attached at each end to a continuous length of roller chain. Since each of the multiple slates making up a single elevator surface is carried by a separate pair of chains, relatively wide and relatively heavy items may be moved upwardly and downwardly.

[0011] The present invention will now be further described by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a live storage accumulator used in conjunction with two continuous vertical conveyors;

Fig. 2 is a top elevational view showing one level of the accumulator and conveyors of Fig. 1;

Fig. 3 is a side elevational view of the live storage accumulator and conveyors of Fig. 1;

Fig. 4 is a side elevational view, partially in section, showing a portion of the continuous vertical conveyor according to the present invention.

Fig. 5 is a top plan view of that portion of the conveyor shown in Fig. 4; and

Fig. 6 is a section on the line 6-6 of Fig. 5.

Detailed Description of the Drawings

[0012] Fig. 1 shows in perspective view a live storage mechanism shown generally as 5 which includes a first continuous vertical conveyor 10 and a second vertical conveyor 110. A storage accumulator shown generally as 70 includes multiple live storage levels stacked vertically and positioned between conveyors 10 and 110. Conveyor 10 is used to lift containers 9 off incoming conveyor 6. Conveyor 10 lifts the containers and loads the containers onto the live storage levels of accumulator 70. The second continuous vertical conveyor 110 is used to unload containers from accumulator 70 as needed and to transfer those containers onto a take-away conveyor 7.

[0013] Referring to Figs. 2-4, three pairs of continuous lengths of roller chain 21a,22a,21b,22b,21c and 22c are provided. Chain 21a forms a pair with chain 22a. Chains 21a and 22a move in parallel paths and carry at least one slat 30a (Fig. 4) therebetween. Chain 21a travels in the continuous path shown in Fig. 3. A pair of drive sprockets carry, guide and drive each of the three pairs of chains. Although each chain may be carried by multiple sprockets, I have found that the use of one sprocket per chain is preferred. That sprocket is the drive sprocket, and the remainder of each chain is guided and carried by drums or shoes. I have also found that it is beneficial to mount all drive sprockets on a common shaft. In Fig. 3, all six drive sprockets are carried on a common shaft shown as 27. Chain 21a is carried, guided and driven by drive sprocket 27. Guiding drum or shoe 26a is positioned vertically above urethane idler drum or shoe 25a. Two common drums 28 and 29 carry all three chains 21a, 21b and 21c.

[0014] As shown best in Fig. 3, chain 21b is guided and carried through its vertical lifting run by lower urethane idler drum or shoe 25b and upper guiding shoe 26b. Chain 21b is also carried by common drums 28 and 29. Similarly, chain 21c is carried and guided through its vertical lifting run by lower idler drum or shoe 25c and upper guiding drum or shoe 26c and is carried throughout the rest of its path by common drums 28 and 29 and drive sprocket 27.

[0015] As shown best in Fig. 4, each pair of chains carries at least one slat such as 30a, 30b and 30c. Slat 30a is carried between chains 21a and 22a. One end of slat 30a is connected to chain 21a by bolts 31a and 32a. Slats 30b and 30c are connected in similar fashion to chains 21b and 21c. Fig. 4 shows the use of idler sprockets 25a, 25b and 25c but it is understood that idler drums or shoes are preferable to idler sprockets.

[0016] Slats 30a, 30b and 30c have generally flat upper surfaces 33a, 33b and 33c which cooperate to form a generally planar, horizontal and multi-sectional elevator surface capable of lifting relatively heavy and relatively wide loads. For example in the embodiment shown in the drawings, the slats are approximately 3,85 metres (eleven feet) in length and are approximately four inches wide. The elevator surface formed by slats 30a, 30b and 30c is capable of lifting a load of 136,4 kg (300 pounds) having a width of 3,5 metres (ten feet). As shown best in Fig. 6, slat 30c includes a rectangular tube 34c which extends the entire length of the slat and generally flat sheet metal top 35c which is bent downwardly along each of its longitudinal edges 36c and 37c.

[0017] Slats 30a, 30b and 30c are synchronized by mounting all six drive sprockets on a common shaft 27 and by the rotation of the drive sprockets at uniform rpm's in order to bring slats 30a, 30b and 30c into horizontal alignment as shown in Fig. 4 when those slats are moving in the upward direction. The synchronization is also facilitated by the use of chains having the same length, which is accomplished by displacing the axes of rotation 40a, 40b and 40c (Fig. 4) of lower idler sprockets a given horizontal distance in one direction and by displacing the axes of rotation of upper idler sprockets or drums 26a, 26b and 26c that same given distance in the opposite direction (Fig. 3). As shown best in Fig. 3, slats 30a, 30b and 30c are aligned to form a planar, horizontal and multi-sectional elevator surface for movement in the vertical direction shown by arrow 3.

[0018] As used herein and in the claims, the phrase "synchronizing means" includes the horizontal spacing of the shoes or sprockets 25a, 25b and 25c and guiding drums 26a, 26b and 26c as well as the use of the same size chain and sprockets for supporting each of the three pairs of chains shown in Figs. 3 and 4 as well as the use of a drive system which rotates the drive sprockets at a uniform rpm.

[0019] As shown best in Fig. 3, a pusher 45 is provided for pushing a container off of incoming conveyor 6 onto the elevator surface formed by slats 30a, 30b and 30c. Pusher 45 includes a horizontal bar 46 which contacts the containers. Bar 46 is carried at each end by two rods 47 carried within two cylinders 48.

[0020] The accumulator 70 may have any desired number of live storage levels. The embodiment shown in Fig. 1 includes six live storage levels 71-76. Each level includes a horizontal, low profile belt conveyor 81-86. Each of the conveyors 81-86 is a wide plastic positive driven belting such as "Intralox"® belting. Each of the low profile belt conveyors 81-86 is spaced apart vertically an equal distance which leaves adequate clearance for the containers. Each pair of chains carries multiple slats throughout the length of chain, and the slats are spaced apart on their carrying chains the same distance by which the belt conveyors 81-86 are spaced so that, when the conveyor stops at the position shown in Fig. 3, the containers carried by the elevator 10 are

aligned with the multiple slats and with the surfaces of conveyors 81-86.

[0021] Each of the belt conveyors 81-86 has a receiving end 81a-86a, respectively, and discharge ends 81b-86b respectively. Each of the belt conveyors 81-86 is positioned in vertical alignment with their respective receiving ends aligned vertically and their respective discharge ends aligned vertically.

[0022] Pushers 91-96 are carried by conveyor 10 adjacent each of storage levels 71-76 for pushing containers off the elevator surfaces onto one of the belt conveyors 81-86.

[0023] Each storage level 71-76 also includes a two speed unloading conveyor 101-106. Each of the unloading conveyors 101-106 is aligned horizontally with low profile belt conveyors 81-86. The unloading conveyors 101-106 will operate at low speed to receive one row of containers, as shown by conveyor 102 in Fig. 3. When it is desired to transfer the row of containers from conveyor 102 to vertical conveyor 110, vertical conveyor 110 is stopped at the position shown in Fig. 3, unloading conveyor 102 is driven at its high speed and a container is transferred from its position shown in Fig. 3 onto the elevator surface referenced as 30x in Fig. 3. A pusher 109 is located at the lower portion of vertical conveyor 110 to unload rows of cases onto discharge conveyor 7.

[0024] It is understood that the continuous vertical elevators 10 and 110 may utilize any number of slats to make up an elevator surface. The preferred embodiment utilizes three slats to form each individual elevating surface, as shown in the drawings. It is also understood that any number of live storage levels could be utilized in the accumulator 70.

Claims

1. A continuous vertical conveyor (10) comprising:

   first (21a,22a) and second (21b,22b) pairs of continuous lengths of roller chain,
   at least one pair of drive sprockets (27) carrying, guiding and driving each of said pairs (21a, 22a;21b,22b) of chain in a single direction continuously,
   each of said first and second pairs (21a,22a; 21b,22b) of chain moving in parallel paths and each pair carrying at least one support means (30a,30b) extending therebetween, characterised in that the or each support means is in the form of a slat (30a,30b) which provides a generally horizontal support surface (33a,33b) when said pair of roller chains (21a,22a;21b, 22b) is moving in a vertical direction,
   synchronizing means (27,21a,21b,22a,22b, 25a,25b, 26a,26b) being provided for aligning two or more of said slats (30a,30b) carried by said first and second pairs of chain to form a generally planar, horizontal, multi-sectional elevator surface (33a,33b) wherein two slats (30a,30b) are adjacent each other when said first and second pairs of chains (21a,22a;21b, 22b) are moving in a vertical direction.

2. A conveyor as claimed in claim 1, in which each of said chains (21a,22a;21b,22b) has the same length, and each of said chains is carried vertically by an upper (26a,26b) and lower (25a,25b) sprocket or drum, said upper sprockets or drums (26a) carrying said first pair (21a,22a) of chains, being displaced horizontally a given distance in one direction from said upper sprockets or drums (26b) carrying said second pair (21b,22b) of chains and said lower sprockets or drums (25a) carrying said first pair (21a,22a) of chains are displaced horizontally said same given distance in an opposite direction from said upper sprockets or drums (26b) carrying said second pair (21b,22b) of chains.

3. A conveyor as claimed in claim 1, in which each of said pairs (21a,22a;21b,22b) of chain carries multiple slats (30a,30b), said slats (30a,30b) being equally spaced apart along the entire length of said chain (21a,22a;21b,22b).

4. A conveyor as claimed in claim 3, in which each of said slats (30a,30b) comprises a rectangular tubular member (34c) extending lengthwise and a generally flat, metallic top portion (35c) carried by said rectangular member (34c).

5. A conveyor as claimed in any of claims 1 to 4, further comprising a third pair (21c,22c) of continuous length of roller chain and wherein each of said slats (30a,30b,30c) is at least 3.5 metres (ten feet long, and wherein three slats (30a,30b,30c) together form an elevator surface (33a,33b,33c) capable of lifting 136.4Kg (three hundred pounds).

6. In combination, first and second continuous vertical conveyors (10,110) and a storage accumulator (70), wherein each vertical conveyor (10,110) comprises:

   first and second pairs (21a,22a;21b,22b) of continuous lengths of roller chain,
   first and second pairs of sprockets (27) carrying and guiding said pairs of chains in a single direction continuously,
   each of said first and second pairs (21a,22a; 21b,22b) of chain moving in parallel paths and each pair carrying at least one support means (30a,30b) extending therebetween, characterised in that the or each support means is in the form of a slat (30a,30b) which provides a generally horizontal support surface (33a,33b) when said pair of roller chains is moving in a

vertical direction, synchronizing means (27,21a,21b,22a,22b,25a,25b,26a,26b,) being provided for aligning two or more of said slats (30a,30b) carried by said first and second pairs of chain to form a generally planar, horizontal, multi-sectional elevator surface (33a,33b) wherein two slats (30a,30b) are adjacent each other when said first and second pairs (21a, 22a;21b,22b) of chain are moving in a vertical direction,
and in that said accumulator (70) comprises:
multiple live storage levels (71-76) wherein each level comprises a horizontal, low profile belt conveyor (81-86) each belt conveyor (81-86) having a receiving end (81a-86a) and a discharge end (81b-86b), each of said belt conveyors being positioned in vertical alignment,
pusher means (91-96) carried by said first continuous vertical conveyor (10) adjacent each of said storage levels (71-76) for pushing containers off said elevator surface (33a,33b) onto one of said belt conveyors (81-86), and
unloading means (101-106) for transferring containers from one of said belt conveyors (81-86) to said second continuous vertical conveyor (110).

7. Apparatus as claimed in claim 6, in which each of said pairs (21a,22a;21b,22b) of chain carries multiple slats (30a,30b), said slats (30a,30b) being equally spaced apart along the entire length of said chain, and wherein each of said live storage levels (71-76) of said accumulator (70) are spaced equally apart a distance which is the same as the distance between said slats (30a,30b).

8. Apparatus as claimed in claim 6, in which said unloading means (101-106) comprises two speed unloading conveyors at each of said live storage levels (71-76), each of said unloading conveyors being aligned horizontally with one of said low profile belt conveyors (18-86) and being located adjacent the discharge end (81b-86b) of said low profile belt conveyors (81-86).

Patentansprüche

1. Vertikale Stetigfördereinrichtung (10), die umfaßt:

erste (21a,22a) und zweite (21b,22b) Paare durchgehender Längen von Rollenkette,

mindestens ein Paar von Antriebskettenrädern (27), die jedes der genannten Kettenpaare (21a,22a;21b,22b) kontinuierlich in eine einzige Richtung tragen, führen und treiben,

wobei jedes der genannten ersten und zweiten Kettenpaare (21a,22a;21b,22b) sich in parallelen Wegen bewegt und jedes Paar wenigstens ein dazwischen verlaufendes Haltemittel (30a, 30b) trägt, dadurch gekennzeichnet, daß das oder jedes Haltemittel in der Form einer Platte (30a,30b) vorliegt, die eine allgemein horizontale Tragfläche (33a,33b) bereitstellt, wenn das genannte Paar von Rollenketten (21a,22a;21b, 22b) sich in einer vertikalen Richtung bewegt,

wobei Synchronisiermittel (27,21a,21b,22a, 22b,25a,25b, 26a,26b) zum Ausrichten von zwei oder mehr der genannten, durch die genannten ersten und zweiten Kettenpaare getragenen Platten (30a,30b) vorgesehen sind, um eine allgemein ebene, horizontale mehrteilige Huboberfläche (33a,33b) zu bilden, wobei zwei Platten (30a,30b) nebeneinander liegen, wenn die genannten ersten und zweiten Kettenpaare (21a,22a;21b,22b) sich in einer vertikalen Richtung bewegen.

2. Fördereinrichtung nach Anspruch 1, bei der jede der genannten Ketten (21a,22a;21b,22b) die gleiche Länge hat und jede der genannten Ketten vertikal durch eine obere (26a,26b) und eine untere (25a,25b) Transportrolle oder Fördertrommel getragen wird, wobei die das genannte erste Kettenpaar (21a,22a) tragenden genannten oberen Transportrollen oder Fördertrommeln (26a) horizontal um eine gegebene Entfernung in einer Richtung von den genannten oberen Transportrollen oder Fördertrommeln (26b), die das genannte zweite Kettenpaar (21b,22b) tragen, verschoben werden, und wobei die das genannte erste Kettenpaar (21a,22a) tragenden genannten unteren Transportrollen oder Fördertrommeln (25a) horizontal um die genannte gleiche gegebene Entfernung in einer entgegengesetzten Richtung von den genannten oberen Transportrollen oder Fördertrommeln (26b), die das genannte zweite Kettenpaar (21b,22b) tragen, verschoben werden.

3. Fördereinrichtung nach Anspruch 1, bei der jedes der genannten Kettenpaare (21a,22a;21b,22b) mehrere Platten (30a,30b) trägt, wobei die genannten Platten (30a,30b) mit gleichem Abstand entlang der gesamten Länge der genannten Kette (21a, 22a;21b,22b) angeordnet sind.

4. Fördereinrichtung nach Anspruch 3, bei der jede der genannten Platten (30a,30b) ein rechteckiges röhrenförmiges Element (34c), das in Längsrichtung verläuft, und einen allgemein flachen, metallischen oberen Teil (35c) aufweist, der durch das rechteckige Element (34c) getragen wird.

5. Fördereinrichtung nach einem der Ansprüche 1 bis 4, die weiter ein drittes Paar (21c,22c) durchgehender Länge von Rollenkette aufweist und bei der jede der genannten Platten (30a,30b,30c) wenigstens 3,5 Meter (zehn Fuß) lang ist und drei Platten (30a, 30b,30c) zusammen eine Hubfläche (33a,33b,33c) bilden, die 136,4 kg (dreihundert Pfund) heben kann.

6. Kombination aus erster und zweiter vertikaler Stetigfördereinrichtung (10,110) und einem Speicherakkumulator (70), bei der jede vertikale Fördereinrichtung (10,110) umfaßt:

erste und zweite Paare (21a,22a;21b,22b) durchgehender Längen von Rollenkette,

erste und zweite Paare von Transportrollen (27), die die genannten Kettenpaare kontinuierlich in eine einzige Richtung tragen und führen,

wobei jedes der genannten ersten und zweiten Kettenpaare (21a,22a;21b,22b) sich in parallelen Wegen bewegt, und jedes Paar wenigstens ein Haltemittel trägt (30a,30b), das dazwischen verläuft, dadurch gekennzeichnet, daß das oder jedes Haltemittel in der Form einer Platte (30a,30b) vorliegt, die eine allgemein horizontale Tragfläche (33a,33b) bereitstellt, wenn das genannte Paar von Rollenketten sich in einer vertikalen Richtung bewegt,

wobei Sychronisiermittel (27,21a,21b,22a,22b, 25a,25b, 26a,26b) zum Ausrichten von zwei oder mehr der durch die genannten ersten und zweiten Kettenpaare getragenen genannten Platten (30a,30b) vorgesehen sind, um eine allgemein ebene, horizontale, mehrteilige Hubfläche (33a,33b) zu bilden, wobei zwei Platten (30a,30b) nebeneinander liegen, wenn die genannten ersten und zweiten Kettenpaare (21a, 22a;21b,22b) sich in einer vertikalen Richtung bewegen,

und dadurch, daß der genannte Akkumulator (70) umfaßt:

mehrere verfügbare Speicherstufen (71-76), wobei jede Stufe einen horizontalen Bandförderer (81-86) mit geringem Querschnitt umfaßt, jeder Bandförderer (81-86) ein Empfangsende (81a-86a) und ein Abgabeende (81b-86b) umfaßt, und jeder der genannten Bandförderer in vertikaler Ausrichtung angeordnet ist,

Schubmittel (91,96), die durch die genannte erste vertikale Stetigfördereinrichtung (10) neben jeder der genannten Speicherstufen (71-76) zum Schieben von Behältern von der genannten Hubfläche (33a,33b) auf einen der genannten Bandförderer (81-86) getragen werden, und

Entlademittel (101-106) zum Überführen von Behältern von einem der genannten Bandförderer (81-86) auf die genannte zweite vertikale Stetigfördereinrichtung (110).

7. Vorrichtung nach Anspruch 6, bei der jedes der genannten Kettenpaare (21a,22a;21b,22b) mehrere Platten (30a,30b) trägt, wobei die genannten Platten (30a,30b) in gleichem Abstand entlang der gesamten Länge der genannten Kette angeordnet sind, und wobei jede der genannten verfügbaren Speicherstufen (71-76) des genannten Akkumulators (70) um einen gleichen Abstand voneinander entfernt angeordnet ist, der der gleiche wie der Abstand zwischen den genannten Platten (30a,30b) ist.

8. Vorrichtung nach Anspruch 6, bei der das genannte Entlademittel (101-106) zwei Geschwindigkeits-Entladefördereinrichtung an jeder der genannten verfügbaren Speicherstufen (71-76) umfaßt, wobei jede der genannten Entladefördereinrichtungen horizontal mit den genannten Bandförderern (81-86) mit geringem Querschnitt ausgerichtet ist und neben dem Abgabeende (81b-86b) der genannten Bandförderer (81-86) mit geringem Querschnitt angeordnet ist.

Revendications

1. Un transporteur vertical continu (10) comportant :

une première (21a,22a) et une seconde (21b, 22b) paires de longueurs continues de chaînes à rouleaux,
au moins une paire de pignons d'entraînement (27) qui portent, guident et mènent chacune desdites paires (21a,22a ; 21b,22b) de chaînes continuellement dans une seule direction,
chacune desdites première et seconde paires (21a,22a ; 21b,22b) de chaînes se déplaçant dans des chemins parallèles et chaque paire portant au moins un moyen de support (30a, 30b) qui s'étend entre elles, caractérisé en ce que le moyen de support ou chaque moyen de support revêt la forme d'une palette (30a,30b) qui fournit une surface de support généralement horizontale (33a,33b) quand ladite paire de chaînes à rouleaux (21a,22a ; 21b,22b) se déplace dans une direction verticale,
des moyens de synchronisation (27,21a,21b, 22a,22b, 25a,25b,26a,26b) sont fournis pour

aligner deux desdites palettes (30a,30b) ou davantage portées par lesdites première et seconde paires de chaînes pour former une surface élévatrice horizontale généralement plane à plusieurs sections (33a,33b) dans laquelle deux palettes (30a,30b) sont mutuellement adjacentes lorsque lesdites première et seconde paires de chaînes (21a,22a ; 21b,22b) se déplacent dans une direction verticale.

2. Un transporteur selon la revendication 1, dans lequel chacune desdites chaînes (21a,22a ; 21b,22b) a la même longueur et chacune desdites chaînes est portée verticalement par un pignon ou un tambour supérieur (26a,26b) et inférieur (25a,25b), lesdits pignons ou tambours (26a) supérieurs qui portent ladite première paire (21a,22a) de chaînes, étant déplacés horizontalement sur une distance donnée dans une direction à partir desdits pignons ou tambours (26b) supérieurs qui portent ladite seconde paire (21b,22b) de chaînes et lesdits pignons ou lesdits tambours (25a) inférieurs qui portent ladite première paire de chaînes (21a,22a) sont déplacés horizontalement sur ladite même distance donnée dans une direction opposée à partir desdits pignons ou tambours (26b) supérieurs qui portent ladite seconde paire de chaînes (21b,22b).

3. Un transporteur selon la revendication 1, dans lequel chacune desdites paires (21a,22a ; 21b,22b) de chaînes porte plusieurs palettes (30a,30b), lesdites palettes (30a,30b) étant équidistantes sur la longueur totale de ladite chaîne (21a,22a ; 21b, 22b).

4. Un transporteur selon la revendication 3, dans lequel chacune desdites palettes (30a,30b) comporte un élément tubulaire rectangulaire (34c) qui s'étend en sens longitudinal et une portion supérieure métallique généralement plate (35c) portée par ledit élément rectangulaire (34c).

5. Un transporteur selon l'une des revendications 1 à 4, qui comporte de plus une troisième paire (21c, 22c) de longueurs continues de chaînes à rouleaux et dans lequel chacune desdites palettes (30a,30b, 30c) mesure au moins 3,5 mètres (dix pieds) de long, et dans lequel trois palettes (30a,30b,30c) ensemble forment une surface élévatrice (33a,33b, 33c) capable de soulever 136,4 kg (trois cents livres).

6. Conjointement, un premier et un second transporteurs verticaux continus (10,110) et un accumulateur de stockage (70), dans lesquels chaque transporteur vertical (10,110) comporte :

une première et une seconde paires (21a,22a ; 21b,22b) de longueurs continues de chaînes à rouleaux,
une première et une seconde paires de pignons (27) qui portent et qui guident lesdites paires de chaînes continuellement dans une seule direction,
chacune desdites première et seconde paires (21a,22a ; 21b,22b) de chaînes se déplaçant dans des chemins parallèles et chaque paire portant au moins un moyen de support (30a, 30b) qui s'étend entre elles, caractérisés en ce que le moyen de support ou chaque moyen de support revêt la forme d'une palette (30a,30b) qui fournit une surface de support généralement horizontale (33a,33b) quand ladite paire de chaînes à rouleaux se déplace dans une direction verticale, des moyens de synchronisation (27,21a,21b, 22a,22b,25a,25b,26a,26b) étant fournis pour aligner deux desdites palettes (30a,30b) ou davantage portées par lesdites première et seconde paires de chaînes pour former une surface élévatrice horizontale généralement plane à plusieurs sections (33a,33b) dans laquelle deux palettes (30a,30b) sont mutuellement adjacentes lorsque lesdites première et seconde paires (21a,22a ; 21b,22b) de chaînes se déplacent dans une direction verticale,
et en ce que ledit accumulateur (70) comporte : plusieurs niveaux de stockage disponible (71-76) dans lesquels chaque niveau comporte un transporteur à bande horizontal à bas profil (81-86), chaque transporteur à bande (81-86) ayant une extrémité réceptrice (81a-86a) et une extrémité de décharge (81b-86b), chacun desdits transporteurs à bande étant positionné en alignement vertical,
des moyens poussoirs (91-96) portés par ledit premier transporteur vertical continu (10) adjacents à chacun desdits niveaux de stockage (71-76) pour pousser des conteneurs hors de ladite surface élévatrice (33a,33b) sur l'un desdits transporteurs à bande (81-86), et
des moyens de décharge (101-106) pour transférer les conteneurs à partir de l'un desdits transporteurs à bande (81-86) jusqu'au dit second transporteur vertical continu (110).

7. Un appareil selon la revendication 6, dans lequel chacune desdites paires (21a,22a ; 21b,22b) de chaînes porte plusieurs palettes (30a,30b), lesdites palettes (30a,30b) étant équidistantes sur toute la longueur de ladite chaîne, et dans lequel chacun desdits niveaux de stockage disponible (71-76) dudit accumulateur (70) sont équidistants sur une distance qui est identique à la distance entre lesdites palettes (30a,30b).

8. Un appareil selon la revendication 6, dans lequel lesdits moyens de décharge (101-106) comportent des transporteurs de décharge bi-vitesse à chacun desdits niveaux de stockage disponible (71-76), chacun desdits transporteurs de décharge étant aligné horizontalement avec l'un desdits transporteurs à bande à bas profil (81-86) et étant monté adjacent à l'extrémité de décharge (81b-86b) desdits convoyeurs à bande à bas profil (81-86).

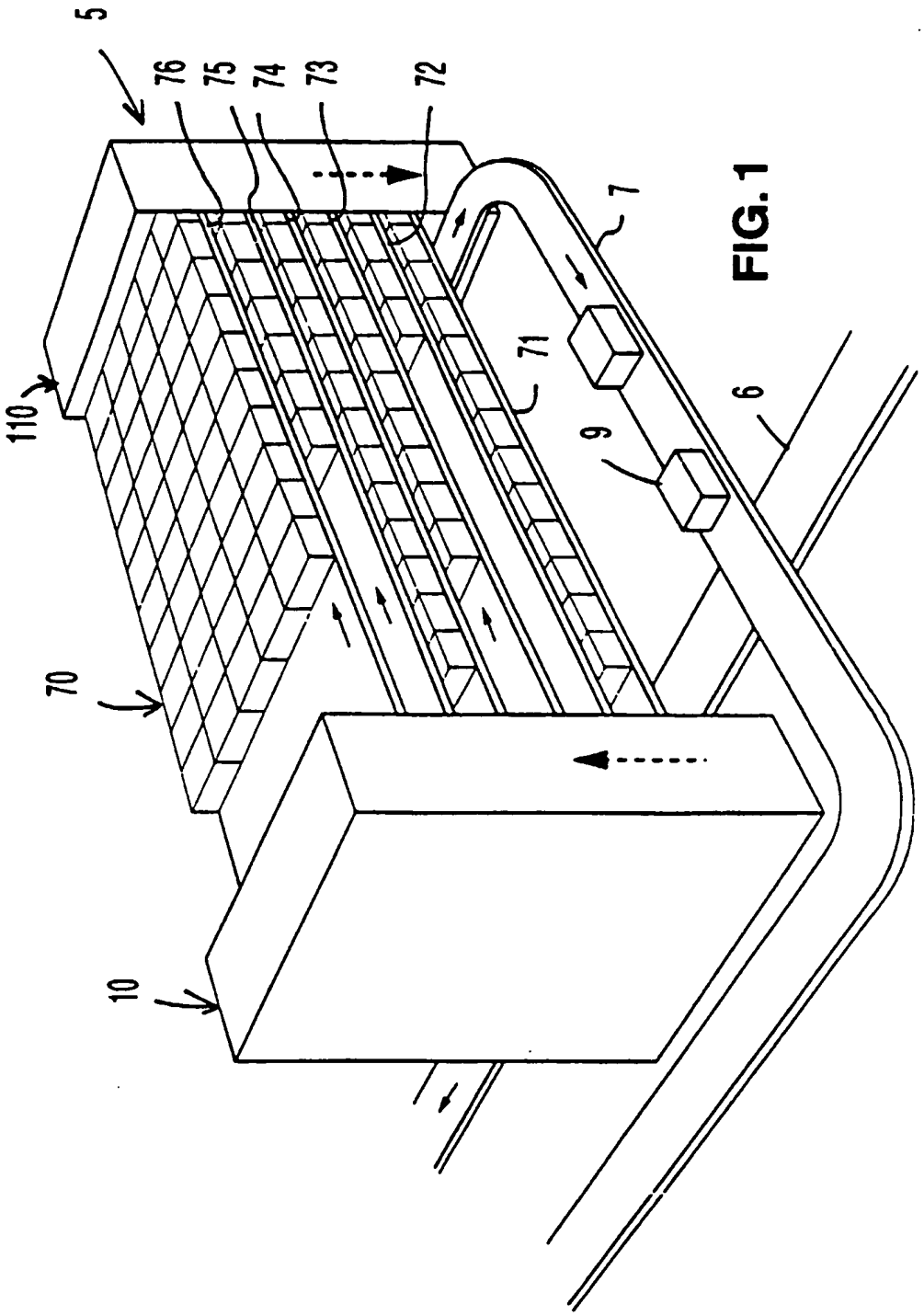

FIG. 1

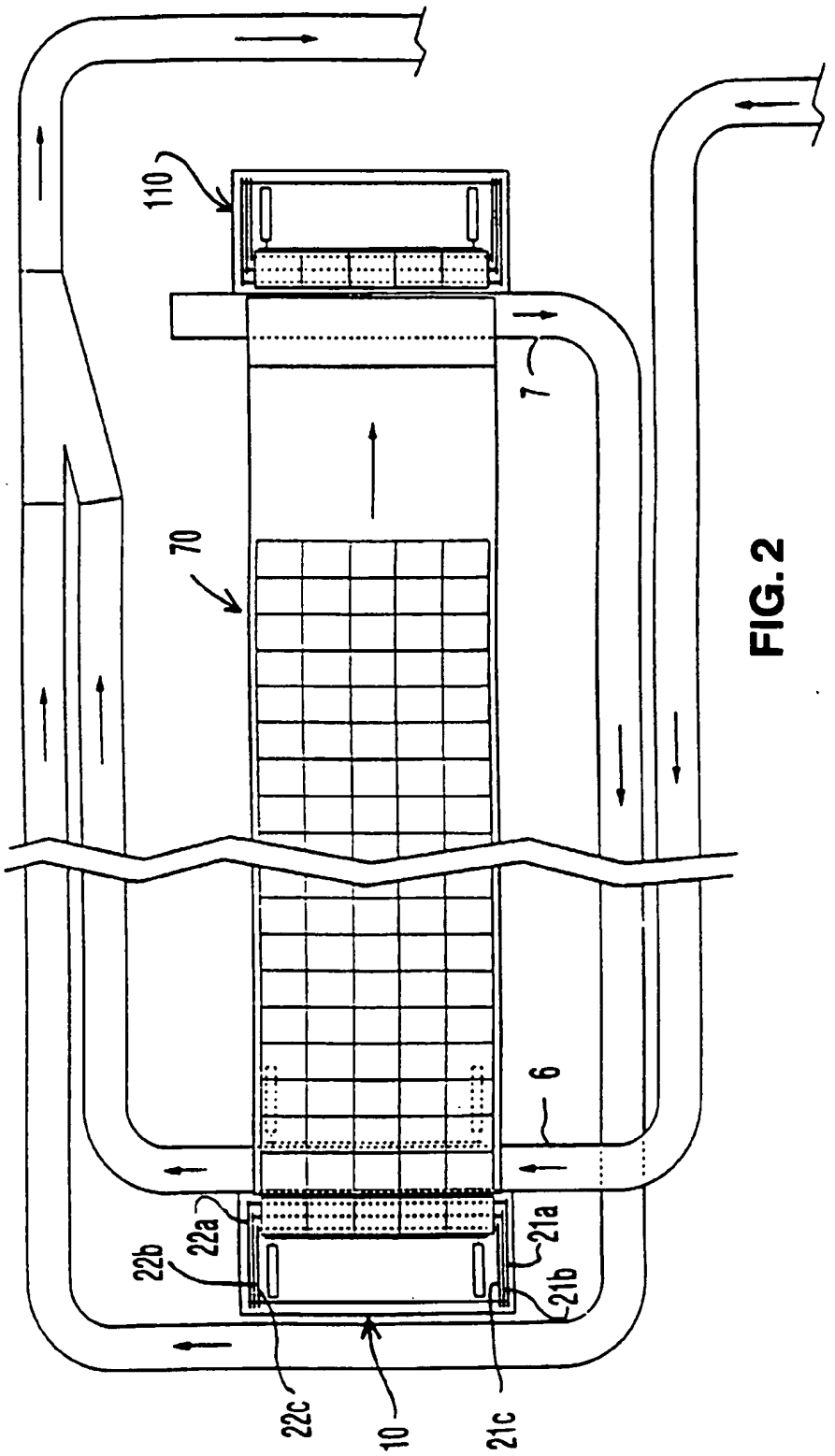

FIG. 2

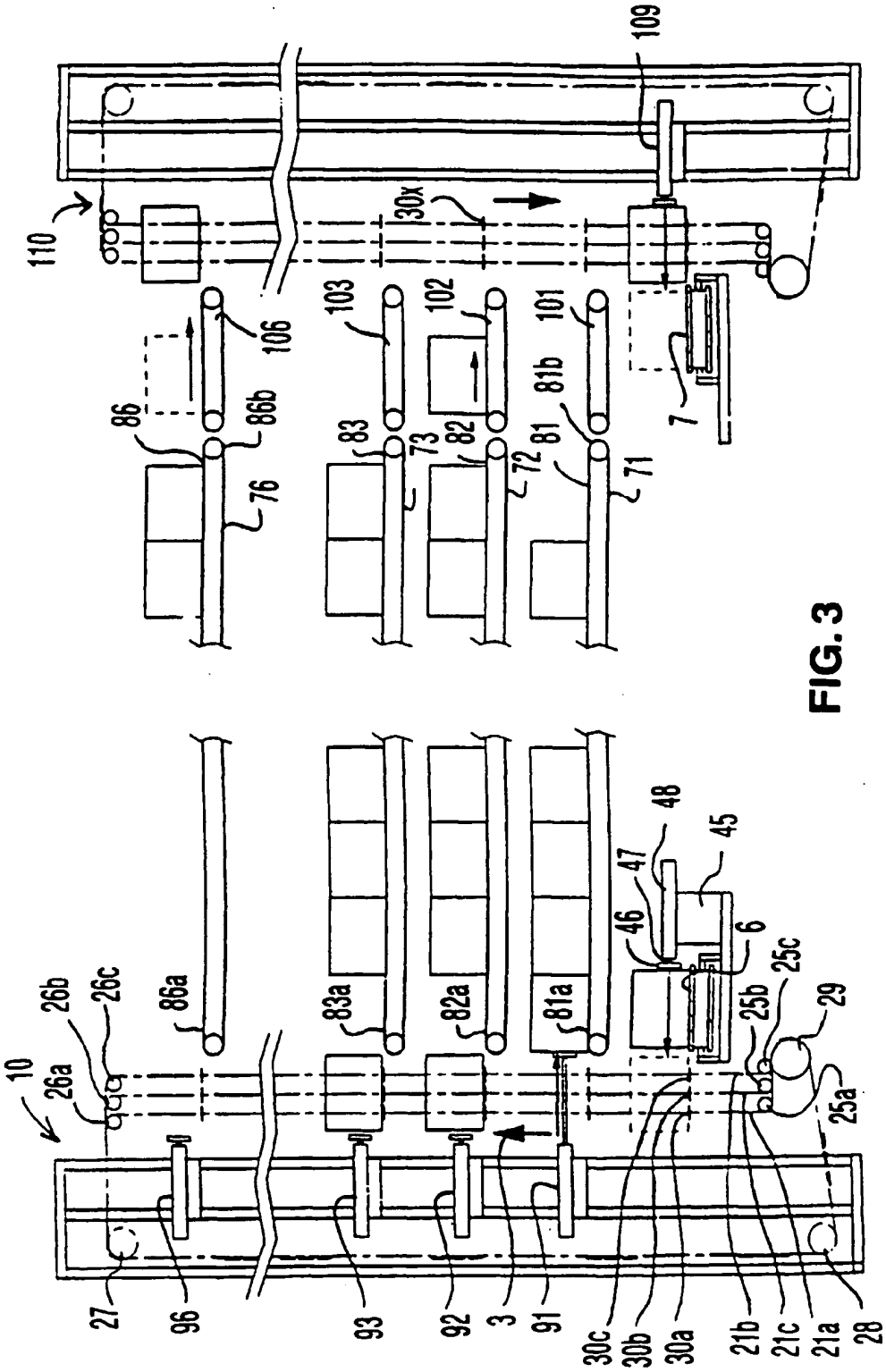
109
110
30x
103
102
101
106
86
86b
83
73
82
81
81b
72
71
76
7
48
45
47
46
6
25c
25b
29
25a
10
26a
26b
26c
86a
83a
82a
81a
27
96
93
92
3
91
30c
30b
30a
21b
21c
21a
28

FIG. 3

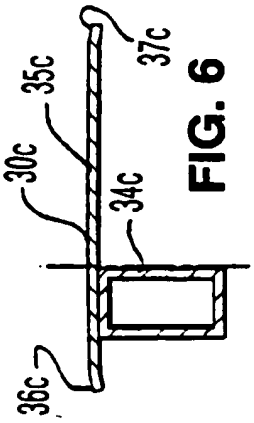
35c
37c
30c
34c
36c

FIG. 6

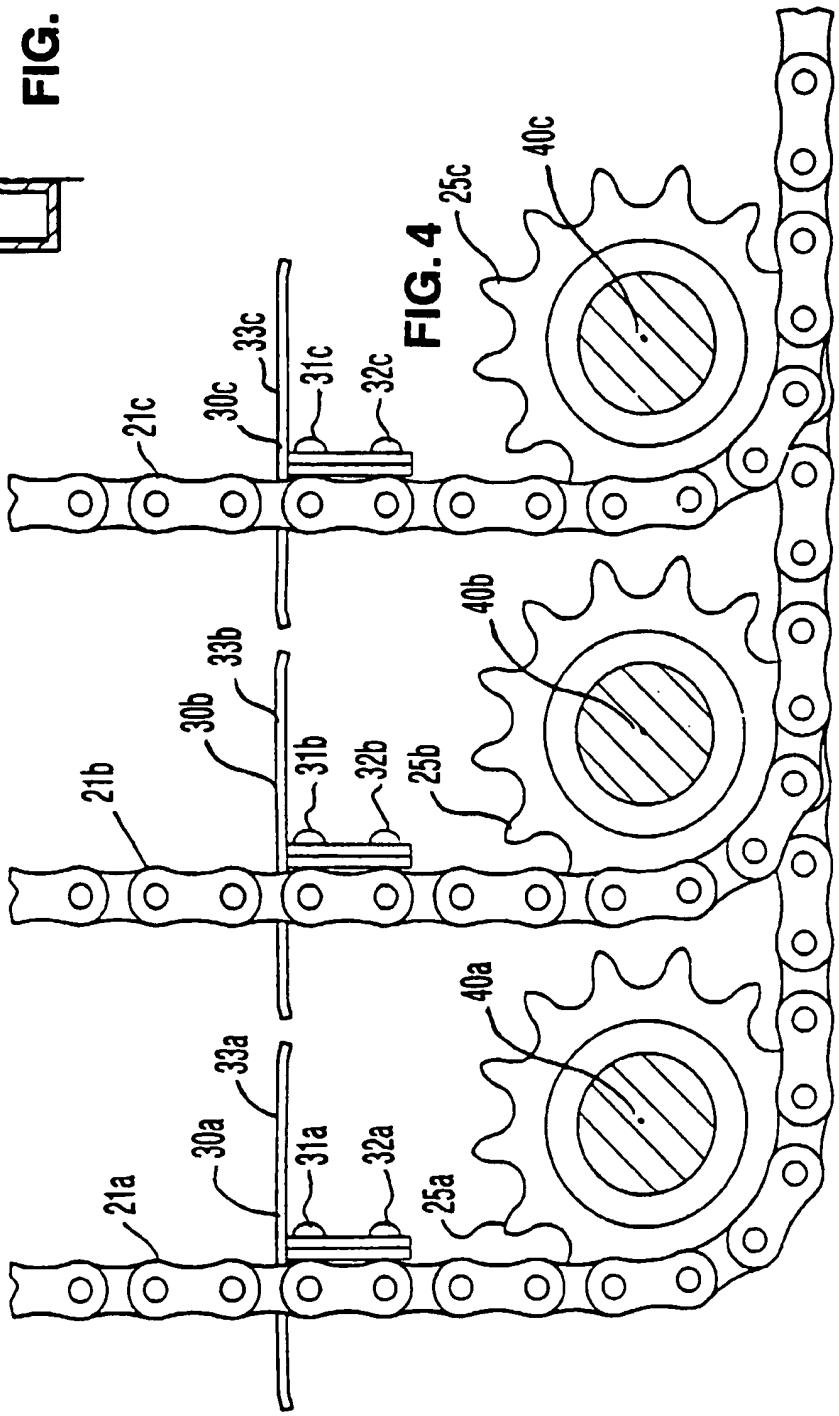
21c
30c
33c
31c
32c
25c
40c
21b
30b
33b
31b
32b
25b
40b
21a
30a
33a
31a
32a
25a
40a

FIG. 4

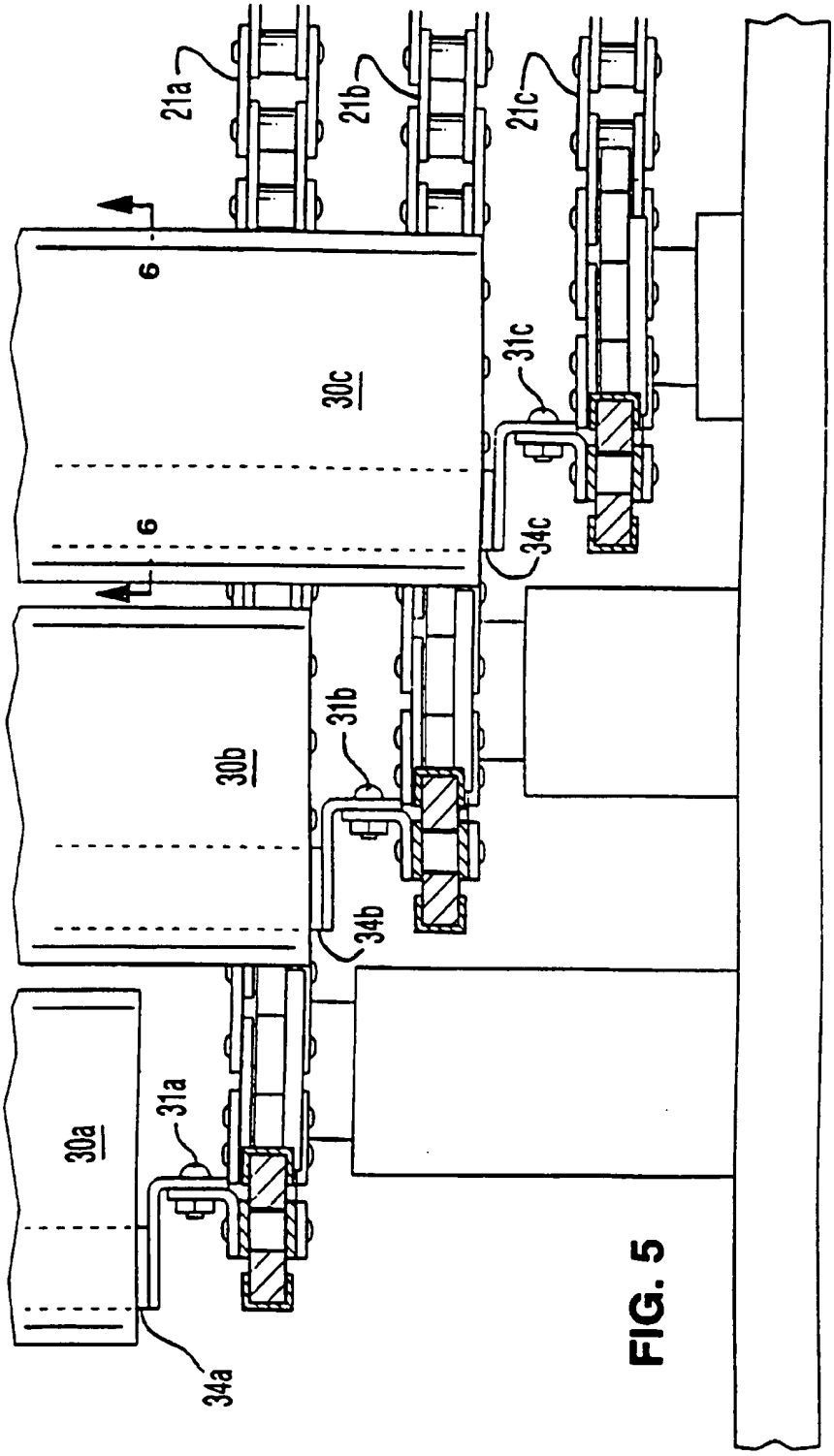

FIG. 5